

WHAT IS CLAIMED IS:

1. A stentless prosthetic heart valve, comprising:  
a first thin, flexible leaflet and a second thin, flexible leaflet, each of the  
leaflets having an inner face, an outer face, an in-flow edge, an out-flow edge, and side  
5 edges, the plurality of leaflets being sewn directly together along at least a portion of their  
side edges so as to form a substantially tubular valve structure having an in-flow end and an  
out-flow end, adjacent leaflets being arranged so that their side edges are substantially  
aligned and the inner faces of the leaflets engage each other adjacent the side edges, and a  
width of the in-flow edge of the first leaflet is greater than a width of the out-flow edge of  
10 the second leaflet,

wherein the valve structure is movable between a closed position in which  
the out-flow edges of adjacent leaflets engage each other, and an open position in which the  
out-flow edges of adjacent leaflets are separated from each other except along the side  
edges, the sewn portions of the side edges of the leaflets biasing the leaflets toward a  
15 partially closed position.

2. A heart valve as in Claim 1, wherein the aligned leaflet side edges extend  
generally outwardly from the substantially tubular valve structure.

3. A heart valve as in Claim 1, wherein each of the leaflets comprises a tab  
portion adjacent the leaflet out-flow edge.

20 4. A heart valve as in Claim 3, wherein each tab portion extends beyond the out-  
flow edge of the corresponding leaflet.

5. A heart valve as in Claim 3, wherein the tab portions are disposed adjacent at  
least one of the leaflet side edges.

25 6. A heart valve as in Claim 5, wherein a tab portion is formed adjacent each  
leaflet side edge.

7. A heart valve as in Claim 6, wherein the tab portions of adjacent leaflets are connected to each other to form commissural attachment tabs.

8. A method for making a stentless tubular prosthetic heart valve, comprising:

providing a section of substantially flat, flexible material;

5 cutting a plurality of leaflets out of the flat material, each of the leaflets having an inner face, an outer face, a proximal end, a distal end, side edges, and tab portions adjacent the distal end and tending from the side edges, wherein a width of the in-flow edge of the first leaflet is greater than a width of the out-flow edge of the second leaflet;

10 aligning the side edges of adjacent leaflets together so that the inner faces of adjacent leaflets engage each other adjacent the side edges; and

sewing aligned side edges together so as to form a substantially tubular valve structure having an in-flow and an out-flow end.

9. The method of Claim 8, wherein providing a section of substantially flat, flexible material involves providing a section of pericardium and fixing the pericardium.

15 10. The method of Claim 9, wherein the material is equine pericardium.

11. The method of Claim 8, wherein cutting a plurality of leaflets is accomplished using a non-contact cutting apparatus.

12. The method of Claim 11, wherein cutting a plurality of leaflets is accomplished using a laser.